REMARKS

Claims 1-24, as amended, appear in this application for the Examiner's review and consideration.

Claim 1 was amended to clarify that the relaxed or pseudo-relaxed useful layer is formed from the strained layer. Claim 1 was also amended to recite that the strained semiconductor layer is grown onto a donor substrate at a thickness that remains below a critical resilient strain thickness which would otherwise cause strain relaxation or an appearance of internal plastic deformations in the strained silicon layer. This is supported by paragraphs [0024] and [0025] of the published application and has been added to confirm that the layer remains in a strained condition when initially deposited on the donor substrate. Claim 1 was further amended to recite a preferred feature for the vitreous layer, namely that it is made of a material that becomes viscous above a certain viscosity temperature of at least about 900°C, as previously recited in claim 22. Claim 22 was amended to be consistent with claim 1. Also, claim 6 was amended to recite that the controlled thermal oxidation treatment converts at least part of the silicon layer into the vitreous layer as a silicon oxide vitreous layer, while claim 12 was amended to clarify what was meant by the bonding step. As none of these changes introduce new matter, the entry of all claim amendments is warranted at this time.

In response to that Examiner's objection to the drawings, applicants submit herewith replacement drawings for Figure 2, which now has been revised to add numerals for the text identified in the office action. In particular, number 5 was changed to 5' in Figures 2h and 2i. Also, the specification has been amended at certain locations to assist in overcoming this rejection. In particular, the objection of reference character 5 has been overcome by amending paragraph [0023] of the specification. This also corrects the objection to item 7, which is shown in Figures 1e, 1f, 1g, 1h and 1i but not Figure 1c. Paragraphs [0026] and [0062] have been amended to clarify that the relaxed layer is denoted by numeral 2' rather than 2. As no new matter has been introduced, it is believed that these specification changes and the drawing changes will be accepted to overcome the rejection.

Claims 1-24 were rejected under 35 USC 112, second paragraph, for the reasons set forth on page 3 of the action. In response, claims 1 and 12 were amended as noted above to overcome the rejection.

Before addressing the rejections, a brief review of the present invention may be helpful. The present invention relates to a method for forming a relaxed or pseudo-relaxed useful layer on a substrate. This method includes growing a strained semiconductor layer on a donor substrate; bonding a receiver substrate to the strained semiconductor layer by a vitreous layer of a material that becomes viscous above a certain viscosity temperature to form a first structure; detaching the donor substrate from the intermediate composite to form a second structure comprising the receiver substrate, the vitreous layer, and the strained layer; and heat treating the second structure at a temperature and time sufficient to relax strains in the strained semiconductor layer and to form the relaxed or pseudo-relaxed useful layer on the receiver substrate. The reasons for relaxing the strains in the strained semiconductor layer is because it becomes easier to grow a strained layer than a relaxed one. To grow a relaxed layer, typically a graded layer of e.g., SiGe is grown, and this is a more complex and time consuming procedure. Thus, the present process facilitates growth of a strained layer by relaxing the strained layer beforehand. This process is applicable for any type of strained layer provided that the layer is below the critical thickness.

Another important feature of the present invention is the recognition that the substrate will be exposed to temperatures This is why the vitreous layer in claim 1 is formulated of a relatively high temperature material, i.e., one that has a certain viscosity temperature of above about 900°C, so that the structure can withstand heat treatments up to such temperatures without relaxing the strain in the strained layer.

Claims 1-6, 11-16, and 18-24 were rejected as allegedly being anticipated by Notsu US patent 6,829,214 while claims 9-10 were rejected as being obvious over the combination of Notsu and US patent 6,873,012 to Stecher and claim 17 was rejected as being obvious over the combination of Notsu and US patent application 2003/0113983 to Henley for the reasons set forth on pages 4-8 of the action. Applicants traverse these rejections.

Notsu discloses an SOI substrate manufacturing method using a transfer method (i.e., bonding and separation). A separation layer is formed on a silicon substrate. A first silicon layer, SiGe layer, second silicon layer, and insulating layer are sequentially formed on the resultant structure to prepare a first substrate. This first substrate is then bonded to a second substrate. The bonded substrate stack is separated into two parts at the separation layer. Next, Ge in the SiGe layer is diffused into the silicon layer by hydrogen annealing to form a strained

layer. With this process, a strained SOI substrate having the SiGe layer on the insulating layer and a strained silicon layer on the SiGe layer is obtained.

Notsu does not disclose the presently claimed method. As noted above, Claim 1 recites growing a strained semiconductor layer on a donor substrate at a thickness that remains below a critical resilient strain thickness which would otherwise cause strain relaxation or an appearance of internal plastic deformations in the strained silicon layer. This step is conducted prior to bonding a receiver substrate to the strained semiconductor layer. In contrast, Notsu does not form a strained layer until after the bonded substrate stack is separated into two parts and the Ge in the SiGe layer is diffused into the silicon layer by hydrogen annealing (col. 9, lines 19-41). As the annealing step is conducted at a temperature of 900-1220°C, the strain in any strained layer that would have been present would be relaxed. This demonstrates that Notsu's structures did not include a strained layer prior to separation.

Furthermore, to avoid forming a strained layer prior to the annealing step, Notsu utilizes a SiGe layer having a Ge concentration of 30 %. This layer is later heated during the annealing step to cause the germanium to diffuse and then form the strained layer. There would be no reasons for the annealing step if Notsu had already obtained a strained layer prior to the separation step.

In contrast, the present invention avoids the use of a graded SiGe layer and directly grows a strained layer onto the donor substrate. Thereafter, the vitreous layer is provided to protect the strained layer from relaxing during subsequent heating or processing steps. Notsu does not disclose these features so that all rejections based on that patent should be withdrawn.

As to dependent claims 9-10 and 17, neither the Stecker nor the Henley references remedy the previously identified deficiencies of the Notsu patent. Accordingly, these rejections have also been overcome and should be withdrawn.

Thus, the entire application is believed to be in condition for allowance, early notice of which would be appreciated. Should the Examiner not agree that all claims are allowable, then a personal or telephonic interview is respectfully requested prior to the issuance of any further office actions to discuss any remaining issues with the intent of resolving them and expediting the eventual allowance of the claims. Any questions or inquiries should be directed to the undersigned attorney of record at the telephone number provided.

Finally, applicants note that copies of the PTO form 1449 pages that were submitted with their two previously filed information disclosure statements were note returned to applicants' attorney, and copies of these forms are enclosed for that purpose. Also, a further information disclosure statement, with the required fee, is enclosed to submit for the Examiner's consideration certain references that were encountered in a related application. It is believed that the claims are patentable over all these references, and a notice to that effect would be appreciated by making these references of record.

Respectfully submitted,

11/18/05
Date

Allan A. Fanucci (Reg. No. 30,256)

WINSTON & STRAWN LLP
Customer No. 28765
212-294-3311